

REMARKS

In the Office Action mailed July 29, 2003 the Examiner noted that claims 1-36 were pending, claims 20-21, 26-27 are withdrawn from consideration, and claims 1-19, 22-25 and 28-36 have been rejected. New claims 37 and 38 have been added, thus, in view of the forgoing, claims 1-19, 22-25, and 28-38 remain pending for which reconsideration is requested. No new matter has been added. The Examiner's rejections are traversed below.

REJECTION UNDER 35 U.S.C. § 102(e)

In the outstanding Office Action, claims 1-19, 22-25, and 28-36 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,268,865 ("Daniels"). The rejection is traversed and reconsideration is respectfully requested.

Daniels discusses a method for painting three-dimensional (3D) objects where an artist first applies brush strokes to paint a selected view of an object in two-dimensional (2D) space, and the 2D stroke points are later translated to 3D stroke points to make the artist feel like the artist is in effect drawing color directly onto a 3D surface.

The present invention teaches a method of *directly* painting a surface of a 3D object without having to manipulate a corresponding 2D texture. Accordingly, the present invention avoids the screen-space projection technique to prevent brush distortion, smears, etc.

Daniels teaches away from the direct 3D surface painting of the present invention by saying that it is not natural, not practical, too expensive and essentially impossible because of camera view limitations (See Daniels column 1, line 63 - column 2, line 23). Daniels solves these problems, as noted above, by having the artist paint in 2D space. Since Daniels does not try to perform 3D painting, Daniels teaches nothing about 3D painting and is, therefore, not enabling with respect to 3D painting.

The outstanding Office Action states that Daniels' method of painting in 2D space to later translate the brush strokes to 3D strokes anticipates the method of directly painting onto a 3D surface disclosed by the present invention. According to Daniels, a view is selected from a 3D object to allow the artist to paint the selected object in a 2D space. See column 2 lines 31-41. Then, upon determining the width and width direction of the 2D stroke, the 2D stroke points are translated to 3D points. Accordingly, the Daniels method avoids painting in a 3D space to allow the artist to paint in a familiar manner, and then generates the 3D scene. See claim 1,

column 1, line 63 through column 2 lines 2, and column 2 lines 17-23.

In contrast, according to the method of the present invention, painting is done directly on multi-dimensional surfaces. See page 3 paragraph 12, and claims 1, 28, and 31 of the present invention. Therefore, unlike the method in Daniels, the method according to the present invention avoids the process of indirectly manipulating the object in 2D to prevent reduction of the quality of the object being painted. See page 2 paragraph 6 and 7, and claim 4 and 36 of the present application.

The Daniels method discusses rendering as part of the process of painting, including projecting the 3D strokes onto a 2D view to produce projected 2D brush strokes. See column 13 lines 39-54. The present invention is not limited to a specific graphics renderer, instead generates a texture that can be used by any rendering engine such as a software renderer or a graphics based game engine. See FIG. 8 and corresponding text, and page 18 paragraph 101 of the present application.

Further, according to the method of the present invention each stamp (or brush) is “positioned and oriented in a series of points in a view independent manner”. See claim 31 and page 8 paragraph 54. Accordingly, each stamp can be projected onto the tangent plane to paint in a 3D space, resulting in precise application of the brush strokes to the object to be painted. For example, as shown in FIG. 7 of the present invention, the method allows for portions of the strokes falling outside of the world-space brush are identified and are essentially clipped. See page 10 paragraph 65, and claim 36. However, Daniels uses a method in which the object is divided into selected sections/views onto which 2D brush strokes are applied. See claims 1, 20 and 23. Accordingly, the 3D mapped brush strokes are rendered in each animation frame of the scene, using the camera view and 3D surface positions in each such frame. See column 5, lines 15-25.

The present invention discloses a method of painting without first painting the brush on a 2D texture space corresponding to the parametric object. See claim 4. The Examiner alleges that Daniels does not paint on texture; instead, the painting stroke is mapped onto the 3D object surface. See bottom page 4 of the outstanding Office Action. However, according to Daniels painting on texture is only avoided so that the painting stroke is mapped onto the 3D model after the brush strokes are applied in a 2D space. See FIG. 1, and column 5 lines 15-25. In contrast, painting according to the present invention avoids painting on a 2D texture space to

allow the user to directly paint in a 3D space. See claims 1 and 28 of the present invention.

Therefore, since the Daniels method only discusses painting an image in a 2D space explicitly vowing to avoid painting in 3D space, and the present invention discloses a method of directly painting a brush onto a surface of an area displaying parametric objects in 3D, the Examiner's rejections are traversed.

REJECTION UNDER 35 U.S.C. § 103(a)

In the outstanding Office Action, claims 8, 10, 30 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Daniels, as applied to claims 1 and 28, in view of U.S. Patent No. 6,239,809 ("Morioka"). The rejection is traversed and reconsideration is respectfully requested.

Morioka discusses an image-processing device comprising a rendering processing section for generating color data for frames comprising a plurality of polygons.

Bossut discusses a method for rendering textured brush strokes in a resolution-independent context where the method includes obtaining a stack of image rendering layers to be composited, and applying at least one texture map to at least one selected layer in the stack.

The present invention discloses a method of painting an object in a 3D space where the painting comprises computing target plane by computing a normal vector at an intersection point.

The Examiner acknowledges that Daniels does not disclose an interpolated normal vector, and does not disclose that a particular brush is selected based on a determination of an appropriate brush resolution. The Examiner relies on Bossut as teaching a method for multi-resolution texture mapping that offers the user the capability of touching up coarse details at one resolution, and fine details at a magnified resolution. And the Examiner relies on Morioka as teaching an image processing comprising an interpolated normal vector. According to Morioka, the rendering processing section of the image-processing device comprises polygon parameters for generating color data attributed to the polygons that comprise normal vectors. See claim 7 and FIG.2. The stated purpose of Morioka is to improve the rendering process especially in case where a frame contains a plurality of polygons, which overlap with each other. See column 1 lines 35-49, and lines 55-56.

In contrast, the present invention's method of painting comprises an interpolated normal vector to compute a tangent plane and allow the user to have a 3D painting environment. See claim 1, and 10. Thus, in view of the fact that Daniels teaches away from painting in 3D space, it would not have been obvious to one of ordinary skill in the art at the time of the invention to utilize Morioka's vector to a method of computing tangent plane to provide a 3D painting environment.

Bossut's method obtains a stack of image rendering layers to be composited, and applies at least one texture map to at least one selected layer in the stack. See claims 1 and 12. The present invention provides a method of adjusting the brush texture size based on comparison to the resolution of the texture being painted where a table can be used to store different resolutions of the same brush image. See page 17 paragraph 98 and 99. Accordingly, since the present invention stores each stamp separately, allows a more flexible use painting environment than Bossut.

The burden of establishing a prima facie case of obviousness based upon the prior art lies with the Examiner. In re Fritch, 23 U.S.P.Q. 2d 1780, 1783 (Fed. Cir. 1992). According to In re Fritch, the Examiner "... can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references." Morioka does not teach "computing a tangent line by computing an interpolated normal vector" in order to provide direct painting in a 3D space.

NEW CLAIMS:

New claim 37 has been added to further emphasize an aspect of the present invention that allows a user to paint by "painting a brush directly onto a surface of the area in the three dimensional space". This avoids the distortion and smears that results from the user effectively painting in a 2D space for later projection of the image into a 3D object.

New claim 38 emphasizes that a tangent space brush is used in the 3D painting thereby allowing the present invention to do what the prior art cannot.

Nothing in the prior art teaches or suggests the features of the new claims. It is submitted that these new claims distinguishes over the prior art.

CONCLUSION:

In accordance with the foregoing, it is respectfully submitted that all outstanding objections and rejections have been overcome and further, that all pending claims are not anticipated. Thus, there being no further outstanding objections or rejections, the application is submitted as being in condition for allowance, which action is earnestly solicited.


Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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